Wood Duck Management

ONTARIO
PROVINCE OF OPPORTUNITY

Department of the Environment
Hon. George A. Kerr, Q.C., Minister J.C. Thatcher, Deputy Minister

C O N T E N T S

	Page
Introduction	1
Breeding Habitat	2
Brood Rearing Habitat	5
Brood Habitat on Impoundments - A Case Study	8
Methods of Population Dispersion	10
Nest Boxes	12
Mounting, Protection and Placement of Boxes	14
Habitat Management on Impoundments	16
Checklist of Habitat Requirements	19
Checklist of Nesting Cavity Criteria	20

WOOD DUCK

MANAGEMENT MANUAL

Introduction

From a continent-wide view, wood ducks once were regarded as a vanishing resource. We've come a long way since those times and, thanks to proper management in many areas of the eastern United States, "woodie" populations have grown and once more these birds are a common sight. The reason for their original decline was tied to a lack of natural tree nesting cavities after the mature eastern forests were cut over. Artificial boxes came into vogue as replacements for the hollow trees, but they were expected to work miracles beyond their worth. Often boxes were placed in areas which to the human looked like good duck habitat. Perhaps it was for mallards - but not for woodies. Naturally, wood ducks were not attracted.

It is the purpose of this management paper to offer up-to-date information on wood duck nesting structure designs with emphasis also on the final location of these structures. It is also the intention of this manual to set guidelines for the creation of wood duck habitat which can be incorporated easily into low-quality swamp timber areas which are common throughout southern Ontario.

Breeding Habitat

On natural sites, temporarily flooded bottomland hardwoods no doubt produce the most wood ducks in Ontario. Northern hardwood species such as oak, maple, cottonwood, ash and elm are prominent in most areas. Farther south in Ontario, swamps consisting of red maple, silver maple, elm and sycamore associations are found less commonly.

Cover Requirements

Psychological and physiological security is afforded to breeding pairs by cover that is close overhead and around the ducks, but allows free swimming. About a 50:50 ratio of open water and cover will suffice. The best cover is trees, shrubs, or both. The optimum stage of tree growth is young reproduction, which furnishes low over-head and lateral cover.

There are many shrubs that provide good cover, especially when they are mature. The most desirable is button bush *(Cephalanthus occidentalis L.)*, but alder and willow afford good cover over streams. Less valuable, but still acceptable shrubs are blackberry, greenbrier, sweet pepperbush, sweetbells, viburnum, winter berry, swamp privet, leather leaf, dog-woods, sweet-gale and prickly-ash.

Form, spacing, shape, height and durability of shrubs determine their value to wood ducks. Mature shrubs are best. The ideal shape includes a strong, durable stem that rises about 2 feet above the water and spreads into dense, overhanging branches with room beneath the crown for ducks to swim freely.

Areas where shrubs do not exist contain certain emergents which

seem to fulfill wood duck requirements. They include cattail, soft rush *(Juncus)*, bulrushes *(Scirpus)*, burreed and phragmites.

Loafing sites in the form of logs, stumps, muskrat houses, islands or scattered shoreline are extremely important for breeding pairs.

Water Requirements

Woodlands must be flooded at the time the birds are seeking nest sites. For an area attractive to wood ducks, water depth should be between 3 and 18 inches. Because woodies prefer still or slow-moving water sheltered from the wind, flooded woodlands are especially attractive. A guideline maximum flow for streams is about 3 mph, if an abundance of back-waters and slack eddies are present.

Water should be present in Ontario from the middle of April until the middle of September, with the critical periods occurring between May 15, and August 1. Water should be available during the incubation period, but if water is present within at least one half-mile at that time for the last half of the incubation, the loss of temporarily flooded areas is not critical.

Nest Requirements

Over much of the wood duck's breeding range nest cavities are a limiting factor. If natural cavities are the only nest sites, 20 acres of nesting habitat to 1 acre of brood habitat is ideal. However, in the interest of positive management natural cavities should be regarded as being supplemental only, and every effort to erect artificial structures should be encouraged.

Natural cavities over water are most acceptable, therefore this is the natural location to duplicate with artificial structures. If the

forest is relatively open, wood ducks will seek nests up to one half mile from water, but locating boxes farther than this from water is not wise.

Brood Rearing Habitat

Many of the requirements for brood habitat differ from habitat that attracts nesting pairs. There are five main differences:

1. Animal foods are of increased importance
2. Water must persist until the young can fly
3. Dense cover is of greater importance
4. Herbaceous emergents are of increased importance
5. Trees are not necessary

There is probably no upper limit to the size of an area that will support a maximum brood density of optimum proportions if distribution of water, cover, food, and loafing sites are present. Although a minimum size has not been clearly established, it does not appear worth considering areas of less than 10 acres in size. If water areas are separated by more than 50 yards of land, they are considered isolated. In stream habitat, small brood units, each less than 10 acres in area, should be within a quarter of a mile from each other.

The more shoreline per acre of water the better, provided the distance between opposite shores is not less than 100 feet. This width is necessary to keep predators from trapping broods in cul-de-sacs.

If the requirements discussed in this section are fulfilled, it should be possible to produce two to five flying young per acre each year.

Food Requirements

Animal foods are of critical importance to newly hatched and young ducklings, particularly suface-swimming and flying insects.

Duckweeds *(Lemna and Wolffia)* are important not only for plant foods, but also for the insect life they harbor. Research indicates that insect life is most important until the duckling reaches four weeks of age, then plant foods increase in importance.

Cover Requirements

Overhead cover within a foot or two of the water is vital for wood duck broods. Shrubs alone provide this requirement which living trees cannot do. Tangles of living, dead and dying trees in shallow water up to 3 feet also provide excellent cover. This is especially true for broods that hatch before leaf cover has appeared. The best cover, especially buttonbush, grows as densely together as possible, and allows broods to swim freely under the crowns. Ideal cover composition for broods is

40 - 70% herbaceous emergents

30 - 50% shrubs

0 - 10% trees

Optimum brood habitat should be 75% cover and 25% open water, with a minimum of one-third cover to two-thirds open water.

Emergent plants are much more important for broods than breeding pairs. Although shrubs are desirable for brood cover, emergents that perform the same function are important, and brood use may be high in areas containing little or no shrub habitat.

Water Requirements

Water depths affect the relations between quality, variety, and distribution of food and cover. Generally all wood duck needs are fulfilled by depths between shoreline and 6 feet. The 3 to 6 foot depth

provides the open water unit. Optimum distribution of water depths in brood habitat is estimated as follows:

0 - 1 foot, 25% of the area

1 - 3 feet, 50% of the area

3 - 6 feet, 25% of the area

Openings and channels 5 to 20 feet in width should be scattered rather evenly throughout the cover.

Highest brood use is in habitat with quiet water. On streams this is where water moves less than 1 mph. Broods seldom use faster water, except to get from one use area to another.

Suitable water must be available until the young are on the wing. In Ontario, this means that water must be available until the middle of September for late broods.

Loafing Site Requirements

Loafing sites are important to broods. Best loafing sites are small, yet large enough for the birds to get out of the water to sun and preen themselves. These sites are surrounded by water, allow good visibility and are at the edge of cover.

Such sites should be about 18 by 18 inches or larger in area and 2 to 6 inches above water. About 10 to 20 loafing sites per acre in the form of small islands, muskrat mounds, stumps, logs and tussocks should be scattered throughout the habitat. In some cases, relatively bare points of land and shorelines offer marginal substitutes for more desirable types of loafing sites.

Brood Habitat on Impoundments - A Case Study

According to a survey of wood duck use of impoundments in Maryland, it was found that:

(1) very few impoundments received the majority of the brood use, and

(2) several nesting units were not used by broods. The key to heavy use of certain impoundments is a heavy abundance of brood cover in early spring.

As many of the broods hatch in May, seasonal plant growth in Ontario has not usually proceeded far enough at this time to provide essential brood cover. The cover in heavily-used impoundments consists of dead and downed timber and various swamp shrubs.

The heavily-used Maryland impoundments were developed by constructing dikes and impounding areas of low-quality timber and swamp shrubs.

One unit seemed to provide optimum habitat for wood ducks with up to 7 ducks per acre reared to flight age. Water depth was found to average 17 inches, with a maximum of 37 inches. Water is held to full pool level the year round.

There is a rather sharp drop-off in topography, with the higher 40% of the unit supporting live or partially live trees, shrubs and emergent aquatics. The lower 60% of the unit consists of dead and downed timber with open water or floating vegetation. The shallow water part averages 7 inches in depth, and the deep portion 23 inches. Duck meal, slender pondweed *(Potamogeton pusillus)* and watershield

(Brasenia schreberi) are the only common plant species in the deeper portion of the unit. In the shallow parts, marsh plants include sweet pepperbush, sweetbells, winterberry, sedges *(Carex Spp.)*, rice cutgrass *(Leersia oryzoides)*, three-way sedge *(Dulichium arundinaceum)*, soft rush, and water purslane *(Ludvigia palustris)*. A pH of 5 to 8, total alkalinity of 12 to 50 ppm, and total nitrates up to 1.4 ppm occurred. Much of the water draining into this unit came off fields which were heavily limed and fertilized. The runoff increased fertility and made it higher than normal for such an acid site.

Over most of the wood duck's breeding range similar impoundments of 10 to 20 acres or larger could be constructed. An integrated system of artificial nest box placement and the creation of adequate brooding habitat would materially increase wood duck populations over much of southern Ontario.

Methods of Population Dispersion

Wood duck populations are generally quite localized in southern Ontario. An exceptional situation on the Rideau River in eastern Ontario exists, however, where continuous habitat is found along the river's edge for miles. Breeding birds tend to be found only in those pockets of habitat that are suitable for completing a life cycle. Often breeding and brooding habitat are present, but a lack of nesting cavities creates a limiting factor.

In many cases, present habitat needs only elementary management to make it preferred for wood ducks. Much of the flooded bottomland swamps and meandering streams in Ontario can be made suitable with a very small degree of effort involved. Breeding birds seeking nesting habitat will not normally wander far from the areas in which they were hatched and raised. Only in years when water levels are not normal or when large surpluses of breeders occur, pairs wander long distances to seek new habitat.

For these reasons, it is necessary to create new habitat in close proximity to areas where birds already breed. Good man-made habitat has often lacked wood ducks for years until abnormal conditions forced breeders out of their ancestral areas into new regions.

Owing to their reliance on water conditions and special habitat requirements, wood ducks do not usually produce large surpluses in unmanaged habitat. For this reason, it is necessary to provide optimum conditions in core areas to induce surplus breeders to pioneer newly created habitat. Nest boxes should be placed in clusters on good

breeding and brooding sites to build wood duck numbers. Improvements should then radiate from these managed central core areas to supply excess breeders for new habitats.

Nest Boxes

Nest boxes, properly placed in good breeding habitat, predator-proofed and maintained regularly can produce many more wood ducks per acre than natural cavities.

Box Requirements

A well-built box should last 25 years or longer if made of cypress lumber, 26-gauge galvanized sheet metal, or aluminum. If it is desirable to erect less durable boxes (5 years or less), rough-cut pine or spruce lumber is satisfactory. Western red or eastern white cedars will last for 8 - 10 years.

Boxes should be inspected each winter and repairs made. If annual maintenance is not possible, inspection should be made at least every third year. The less durable the material, the more often inspection is required.

When a nest box program is started, acceptance of wood ducks is generally greater in wooden than in metal boxes. Likewise, vertical boxes may receive greater acceptance than horizontal ones. Initially it may be important to provide vertical wooden boxes, then graduate to the more durable metal types.

Figure 1 illustrates an up-to-date design that is quite starling-proof and easily constructed. This particular box probably represents an ideal form and should be adopted over older types where feasible. Once a population begins to use artificial structures, the type of box seems to make little or no difference, and other more durable or more predator-proof materials can be used. Metal boxes do not, as once

thought, lower hatching success or increase desertion.

If predator-proofing in the form of metal cones, sandwiched aluminum sheets, or aluminum down-spouting is integrated into the vertical structure, a 4-inch diameter circular hole is preferable. Horizontal structures with a 4x11-inch or 5x11-inch hole will discourage starling nesting.

As wood ducks do not carry nesting material, it must be provided for them. A sawdust-wood shaving mixture seems to be best. Nesting material should be provided to a depth of 3 to 5 inches. A 5-inch layer in the bottom of horizontal boxes with a shallow depression formed near the back of the box encourages hens to nest in the most psychologically secure portion of the structure.

Young wood ducks leave the nest by a progressive series of upward leaps before they are 24 hours old. The interior of the box must therefore contain toeholds permitting them to cling to the inside of the box before the entrance is gained. Constructing boxes of rough lumber will provide such sites, but metal and plywood structures require screen or hardware cloth strip, 4 inches or more wide, extending to the entrance from the nest basin.

Mounting, Protection and Placement of Boxes

Where feasible, posts are the most suitable mounts for boxes, because they are easier to predator-proof and can be placed where desired. It may be better to mount boxes on trees under certain situations, including

1. Extreme water fluctuations (3 feet or more)
2. Depth of water too great
3. A very soft, unstable bottom
4. Extreme ice movement
5. Economy

When mounting boxes on metal posts, the bottom type must be considered. If the pond bottom is moderately firm, an 8 foot post driven about 2 feet into the soil is adequate. If the bottom is deeper and soft, one post can be driven into the bottom with only 2 to 3 feet projecting above the water surface. A second post is bolted on with sufficient overlap to provide strength and height.

The best height for boxes is 4 to 5 feet above the high water mark where boxes are on posts over water. In upland woods, heights of around 45 feet seem to have the greatest use. Boxes will be used if hung as low as 15 feet. The direction of the entrance is immaterial as long as it is easily visible to the ducks.

A nest box program must not be attempted unless boxes are adequately predator-proofed. An effective guard for large trees is a metal band 50 inches wide.

Boxes should be erected in clusters of five to ten, spaced at 50- to 100-foot intervals within clusters. If possible, they should be placed over water within or adjacent to suitable brood cover. When initiating a program, it is important that the boxes be quite visible to the ducks. They should *not* be placed in thick stands of trees or beneath shrub growth.

It is best to start with a few boxes and add to them as they are accepted. Begin with five to ten, for example, and provide more when use reaches 30-50%. Do not put up more boxes than can be maintained.

Habitat Management on Impoundments

Low-grade acid swamps and boggy areas can quite often be converted into good wood duck habitat by strategic placement of a modest water control structure. It should be noted that all water control devices used to create wood duck areas should be of the stop-log or dropboard type, to permit complete periodic drawdowns.

To manage wildlife effectively it is necessary to manipulate vegetation to the desired successional stage. The primary successional stages of aquatic growth best utilized by woodies are most easily created by the manipulation of water levels.

Just as an open field gradually changes its vegetational composition until one day it reaches a climax stage of mixed deciduous forest, the aquatic vegetation of a marsh or pond changes and decomposes until eventually the marsh fills and is covered with trees. The early successional stages of submergent vegetation are the forms most usable by wood ducks, therefore succession must be set back by periodic water drawdowns.

But the picture is somewhat more clouded because of certain chemical changes which take place in an impoundment when vegetation dies and starts decomposing. Especially in acidic sites where much submerged woody material exists (as in high-grade wood duck habitat), high levels of soluble iron and manganese compounds form which act as vegetation inhibitors.

Only acid-tolerant plants survive under such conditions, but these

are of small value to waterfowl. Snails and other invertebrates are unable to accumulate sufficient calcium and phosphorus to build their shells and ectoskeletons, with a resultant lack of these valuable food items for young ducklings. Breeding birds and broods will reject marshes with a dearth of animal foods and select those with a wealth of small crustaceans and other animal life.

One of the most inexpensive and promising techniques for rejuvenating "stale" marshes is a well-planned periodic drainage of the marsh area so that soil aeration will occur. Manganese and iron compounds will become insoluble by aeration and other essential nutrients will be released from decaying over-mature vegetational stages.

Probably the best indicator of a marsh's lowered productivity is the increase in soluble iron. If soil tests indicate an iron concentration of over 100 ppm, drainage is a necessity. Samplings should be taken in July or August, and provisions must be made to treat samples quickly to prevent change before analysis. After it has been determined that a drawdown is needed, a specific procedure must be followed.

Drainage should occur in the late fall to expose at least 75% of the area bottom. Nutrient losses will be smallest when water levels are dropped just before ice forms a permanent winter cover. Water should be withheld from the marsh during winter and spring into the summer until the concentration of dissolved iron has fallen to less than 20 ppm. If water levels are then renewed, little is accomplished except to temporarily correct the problem.

Iron concentrations of over 100 ppm may recur within 2-8 years,

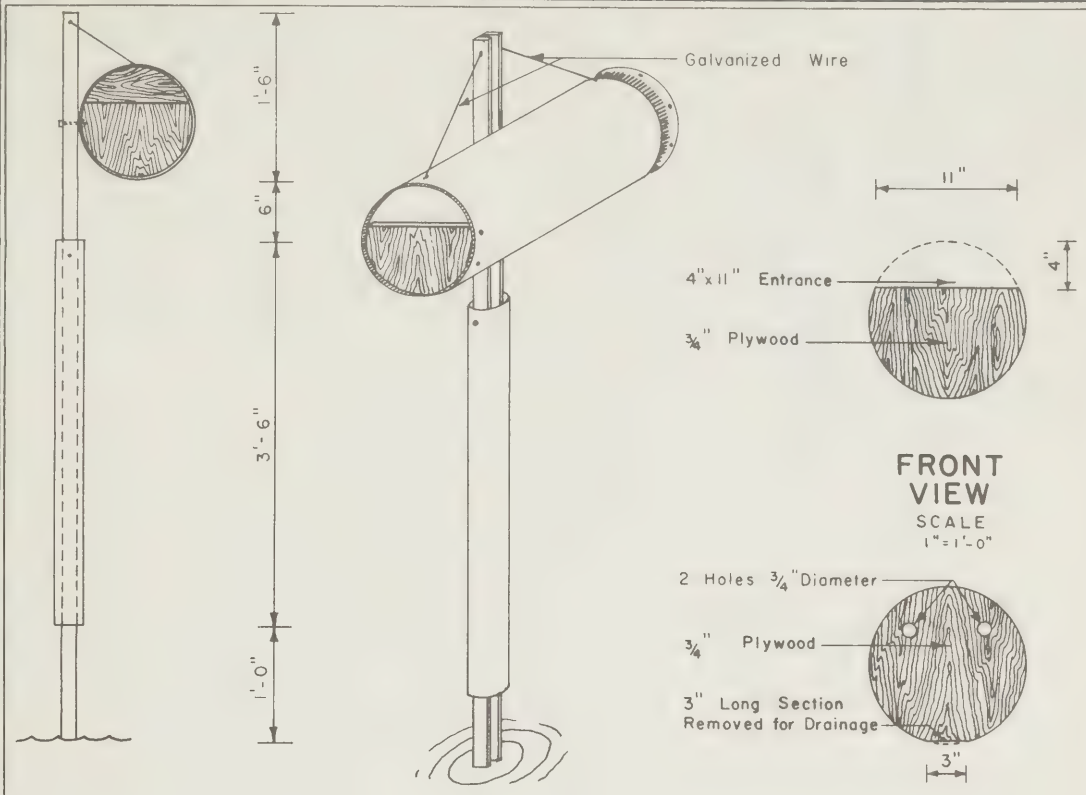
requiring another drawdown. Long-range correction of the problem is accomplished by liming the soil with ground limestone until a pH of at least 7.5 is reached. There seems to be little danger from applying too much lime, but it is possible to add too little, as the soil reaction may be raised to pH 6.5 - the optimum for bringing iron back into solution. In determining lime requirements for a marsh, the reaction of the dried and aerated soil should be used in the calculation.

The costs of liming soils are high, and often the procedure is not feasible because the area is not accessible to equipment. Where liming is not possible, a program of late fall drawdowns should be adhered to based on soluble iron concentrations, but over the long term application of limestone is one of the cheapest methods of providing top quality waterfowl breeding and brooding habitat. Without control over water quality and plant succession on impoundments the value of wood duck boxes is lessened considerably.

Optimum Habitat Requirements		
	Breeding Habitat	Brooding Habitat
Water		
Depth	3 to 18 inches over 75% of area	0 to 1 foot - 25% of area 1 to 3 feet - 50% of area 3 to 6 feet - 25% of area
	Occurrence from mid-April...	until mid-September
Flow	3 mph or less, with abundant backwaters	less than 1 mph
Cover		
Water: Cover ratio	50:50	25:75
Type	flooded trees, shrubs and emergents or combinations	flooded trees, shrubs and emergents or combinations
Over-head height	about 2 feet above water	1 to 2 feet above water
Loafing Sites		
Number	not known-tree limbs used in woodland habitat	10 to 20 per acre
Size	not critical	18 by 18 inches or larger
Height above water	not critical	2 to 6 inches for pre-flight broods
Optimum Densities	1 pair per 20 acres - natural cavities 2 pairs per acre - artificial cavities	2 to 5 flying young per acre

Natural Cavity Criteria		
	Optimum	Acceptable
Height	20 to 50 feet	6 feet and up
Entrance Size	4 inches in diameter	3½ to 12 inches in diameter
Cavity Bottom	10 by 10 inches or 11 inches in diameter	8 to 15 inches in diameter
Depth of Cavity	24 inches	6 to 48 inches
Tree sizes	24 to 36 inches d.b.h.	more than 16 inches d.b.h.
Density	more than 1 usable cavity per 5 acres of timber	1 usable cavity per 5 acres of timber
Distance to water	less than ½ mile	½ mile

Artificial Cavity Criteria		
	Vertical type	Horizontal type
Length	24 inches	24 inches
Diameter of cavity	11 inches or 10 by 10 inches square	12 inches
Entrance size (predator-proof)	4 inches diameter	5 by 11 inches
Entrance size (not predator-proof)	3 by 4 inches 3 vertical, 4 horizontal	same as for vertical type



FRONT ELEVATION
SCALE
3/4"=1'-0"

SCHEMATIC VIEW
NOT TO SCALE

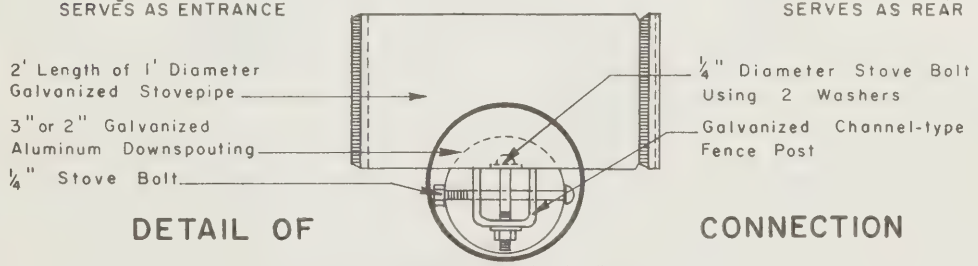
FRONT VIEW
SCALE
1"=1'-0"

REAR VIEW
SCALE
1"=1'-0"

TOP VIEW
SCALE
1"=1'-0"

FRONT
11½" CRIMPED END
SERVES AS ENTRANCE

REAR
12" UNCRIMPED END
SERVES AS REAR

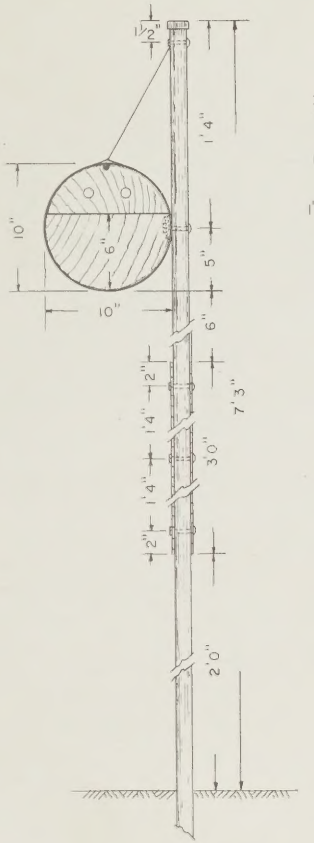


DETAIL OF CONNECTION

SCALE 3"=1'-0"

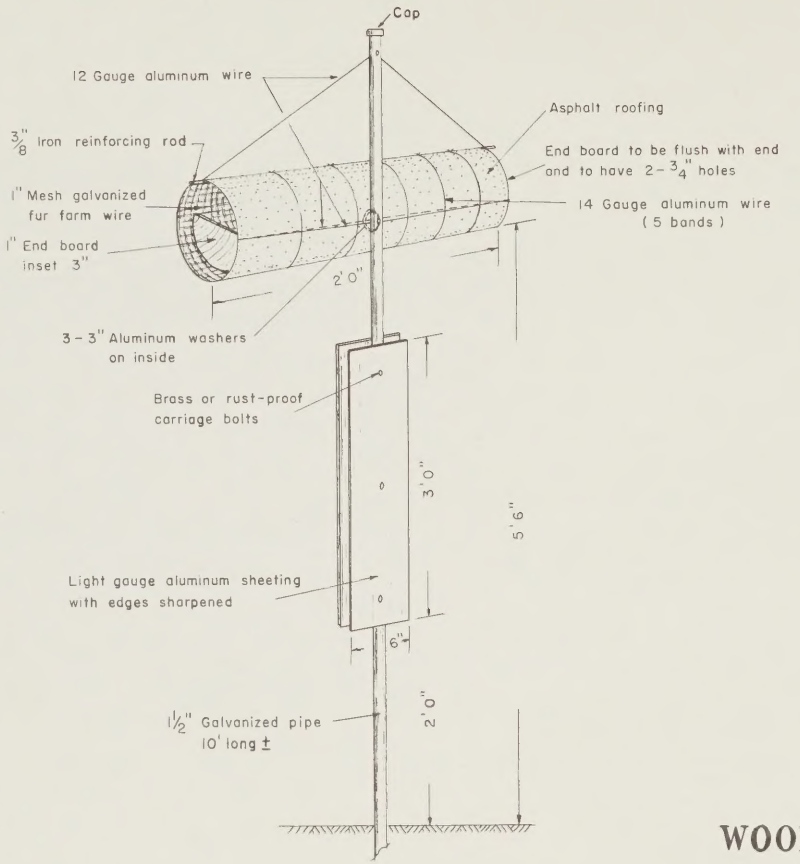
CONSTRUCTION DETAILS FOR STARLING PROOF WOOD DUCK BOX

FIGURE 1



END VIEW

SCALE 0 2 4 6 8 10 12 INCHES



SCHEMATIC VIEW

NOT TO SCALE

PROPOSED

ALTERNATIVE DESIGN

FOR

WOOD DUCK NESTING BOXES

SCALES AS SHOWN

FIG. 3

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